

**Original Research Article** 

# **OF VESTIBULAR EXERCISES IN** EFFECTIVENESS THE MANAGEMENT OF STRESS AND COGNITIVE FUNCTIONS IN OBESE CHILDREN: A PILOT STUDY

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#### ABSTRACT

Background: Childhood obesity is a global issue that needs to be addressed. Vestibular exercises are a simple form of stimulation of the vestibular system. However, the studies where vestibular exercises were applied in the management of the stress and cognitive functions in obese children are sparse. Aims and objectives: The present study was undertaken to observe the Effectiveness of vestibular exercises in the management of stress and cognitive functions in obese children.

Materials and Methods: The present study recruited a total of 30 male and female obese children after obtaining their assent. Age and gender matched 30 obese children were also recruited after obtaining their assent as controls. The participants in the experimental group underwent training in vestibular exercises mentioned in the literature. The stress levels were assessed using the perceived stress scale, which is a standard scale to assess the stress levels. Cognitive functions were assessed using the spatial and verbal memory test. These tests are standard tests to assess spatial and verbal memory.

Results: There was no significant difference between the two groups' scores before the intervention. There was a significant increase in the memory scores followed by the intervention. There was a significant decrease in the stress scores followed by the intervention.

Conclusion: The study results support that there was a significant effect of practicing vestibular exercises daily. Further detailed studies are required in this area to suggest implementation of the vestibular exercise in the management of stress and memory in obese children.

Keywords: Vestibular exercise, children, obesity, Overweight, Memory.

## **INTRODUCTION**

Childhood obesity is a global issue that needs to be addressed. Due to the sedentary lifestyle and eating behaviours in the children, obesity became more common in this age group. As it is very clear that the body mass index is closely associated with the functioning of the heart, obese and overweight children are at risk.<sup>[1]</sup> Further, it was reported that the balance between the two branches of the autonomic nervous system is imbalanced in children with obesity.<sup>[2]</sup> Obesity in childhood will lead to obesity in adult life and also associated noncommunicable diseases.<sup>[3]</sup> Marked increases in the childhood obesity cases were reported in India in the past two decades.<sup>[4]</sup> The set points related to the body weight were controlled by the vestibular system in the conditions where there are excess of energy.<sup>[5]</sup> Vestibular dysfunction was reported in the patients with diabetes in whom the glucose metabolism was impaired. Hence, there exists a relationship between the vestibular stimulation and

the metabolism of glucose. Stimulating the vestibular system regulates the glucose metabolism. Excessive stress and declined cognitive functions were reported in obese children. Vestibular exercises are a simple form of stimulation of the vestibular system. However, the studies where vestibular exercises were applied in the management of the stress and cognitive functions in obese children are sparse. Hence, the present study was undertaken to observe the effectiveness of vestibular exercises in the management of stress and cognitive functions in obese children.

**Aim and objectives:** The present study was undertaken to observe the effectiveness of vestibular exercises in the management of stress and cognitive functions in obese children.

## **MATERIALS AND METHODS**

The present study recruited a total of 30 male and female obese children after obtaining their assent. Age and gender matched 30 obese children were also recruited after obtaining their assent as controls. Obese children within the age group of 5 to 10 years, willing to provide assent, were part of the study. Those who were already under any kind of treatment or therapy and had any severe complications were excluded from the study. The participants in the experimental group underwent training in vestibular exercises mentioned in the literature. These exercises are comprised of three steps of exercises. The duration of the exercises is 45 minutes per session.<sup>[6]</sup> Three sessions per week were practiced by the experimental group children under the supervision of the physiotherapist. Twelve weeks of stimulation exercise sessions were administered to the experimental group children. The control group was either allowed to attend the sessions or to practice the exercises during the study period. But soon after the study's completion, they were allowed to practice the exercises. The stress levels were assessed using the perceived stress scale, which is a standard scale to assess the stress levels.<sup>[7]</sup> Cognitive functions were assessed using the spatial and verbal memory test. These tests are standard tests to assess spatial and verbal memory.<sup>[8]</sup>

#### **RESULTS**

Table 1 presents the demographic data of the participants. The demographic data was not statistically significant among the control and intervention groups. Table 2 presents a comparison of the stress scores, memory scores between the control and experimental groups. There was no significant difference between the two groups scores before the intervention. Table 3 presents the comparison of the stress scorers and memory scores between the control and experimental groups after the intervention. There was a significant increase in the memory scores followed by the intervention. There was a significant decrease in the stress scores followed by the intervention.

Table 1: Demographic data of the participants					
Parameter	Experimental group (n=30)	Control group (n=30)	P value		
Age (years)	5.42±0.67	6.25±0.87	0.0150		
Height (cm)	$117.30{\pm}10.07$	122.30±8.17	0.2383		
Weight (kg)	29.23±6.06	28.92±4.73	0.8874		
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Data was mentioned as mean and SD

Table 2: Comparison of stress scores and spatial and verbal memory scores in control and experimental groups before the intervention

Parameter	Experimental (n=30)	Control (n=30)	P value		
Stress score	22.63±4.93	24.25±6.54	0.5835		
Spatial memory score	4.10±1.20	5±0.67	0.0524		
Verbal memory scores	3.75±1.14	3.86±1.66	0.8519		

Data was mentioned as mean and SD.

Table 3: Comparison of stress scores and spatial and verbal memory scores in control and experimental groups after the intervention

Parameter	Experimental (n=30)	Control (n=30)	P value
Stress score	18.44±4.73	24.25±6.54	0.0002
Spatial memory score	6±1.7	5±0.67	0.040
Verbal memory scores	5.2±1.8	3.86±1.66	0.0040

Data was mentioned as mean and SD.

#### DISCUSSION

The present study was undertaken to observe the effectiveness of vestibular exercises in the management of stress and cognitive functions in obese children. There was no significant difference between the two groups' scores before the intervention. There was a significant increase in the memory scores followed by the intervention. There was a significant decrease in the stress scores followed by the intervention. Earlier studies suggested that prevention of the childhood obesity is much needed in the Indian context.<sup>[9]</sup> Further, many interventions were suggested to prevent childhood

obesity as well.<sup>[10]</sup> Like decreasing the sedentary life style, increase in the physical activity, change in the eating behaviour etc. Education about the consequences of obesity is also so crucial in children, They must be made aware of the consequences.<sup>[10]</sup> Stimulation of the vestibular system was reported to reduce stress.<sup>[11]</sup> The vestibular system can be stimulated by multiple modes like swinging, exercises and non-invasive electrical stimulation, rocking etc.<sup>[12,13]</sup> Stimulating the vestibular system was reported to inhibit the sympathetic adrenomedullary pathway and bring the individual to a stressless condition. At the same time vestibular system plays a key role in cognition. It was reported that dysfunction of the vestibular system causes a decline in cognitive functions.<sup>[14,15]</sup> It was reported that the vestibular system is well connected with the hippocampus. The normal function of the vestibular system is required for the hippocampus to be physiological. The hippocampus undergoes atrophy if there is damage to the vestibular system,<sup>[16]</sup> and vestibular stimulation was reported to improve spatial and verbal memory, functions.<sup>[17]</sup> along other cognitive with Improvement in the auditory and visual reaction time was observed, followed by the vestibular stimulation.<sup>[18,19]</sup> Surprisingly, the decision-making regarding the purchase was also reported to be influenced by the vestibular stimulation.<sup>[20]</sup> The present study results support the earlier studies as there was a significant reduction in the stress scores and a significant increase in the spatial and verbal memory scores followed by the practice of vestibular exercises.

## **CONCLUSION**

The study results support that there was a significant effect of practicing vestibular exercises daily. Further detailed studies are required in this area to suggest implementation of the vestibular exercise in the management of stress and memory in obese children.

**Conflicts of interest:** None declared **Source of funding:** Self-funding.

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